

IN THE CLAIMS:

Please amend the claims as indicated below:

5 1. (Currently Amended) A method of discovering permutation patterns from an input string having a plurality of characters, each character being from an alphabet, for utilization in an application that processes co-located elements discovered in said input string and that processes a relationship between groups of said characters identified by said permutation patterns, the method comprising the steps of:

10 selecting a new portion of the input string, the new portion differing from a previously selected portion of the input string by at least one new character of the input string;

 determining one or more values for how many of the at least one new characters are in the portion of the input string;

15 determining which, if any, names in a plurality of sets of names have changed by selection of the new portion, the plurality of sets comprising a first set and a plurality of additional sets, wherein the first set corresponds to all of the characters in the alphabet and to values of how many of the characters of the alphabet are in the previously selected portion, wherein the values are names for the first set, and wherein each additional set comprises names corresponding to selected pairs of names from a single other set;

20 using changes in the names to determine the permutation patterns; and

 providing said permutation patterns for utilization in said application that processes co-located elements discovered in said input string and that processes said relationship between said groups of said characters identified by said permutation patterns.

25 2. (Original) The method of claim 1, further comprising the step of determining the plurality of levels through the steps of:

 determining the first set by determining values of how many of each of the characters of the alphabet are in the previously selected portion; and

30 determining the additional sets by assigning names for a given additional set to selected pairs of names from another of the sets, wherein each assigned name is unique to the

names for a selected pair.

3. (Original) The method of claim 1, wherein the assigned names are codes.

5 4. (Original) The method of claim 3, wherein the codes are natural numbers.

5 10 (Original) The method of claim 1, wherein the step of determining which, if any, names in a plurality of sets of names have changed determines that a name has changed and further comprises the step of determining that a new name is needed for the changed name

10 6. (Original) The method of claim 5, wherein the step of determining which, if any, names in a plurality of sets of names have changed further comprises the step of selecting a new name, not currently in use in the sets of names, for the changed name

15 7. (Original) The method of claim 1, further comprising the step of determining for a name that has changed in the sets of names, a location in the input string that corresponds to the changed name.

8 20 (Original) The method of claim 7, wherein the changed name corresponds to at least two characters of the input string and a location in the input string of a given character of the at least two characters is chosen as the determined location.

9. 25 (Original) The method of claim 1, wherein each of the names in the sets of names corresponds to a pattern, and wherein the step of using changes further comprises the step of selecting permutation patterns from the patterns.

10. 30 (Original) The method of claim 1, further comprising the step of comparing names that have changed in the sets of names to a database comprising a plurality of stored names.

11. (Original) The method of claim 1, wherein the additional sets have names corresponding to only a single pair of names from another set.

5 12. (Original) The method of claim 1, wherein the step of using changes further comprises the step of correlating the changed names with permutation patterns.

10 13. (Original) The method of claim 12, wherein the step of determining which, if any, names in a plurality of sets of names further comprises, for each changed name, updating a count corresponding to that changed name, and wherein the method further comprises the step of:

15 performing the steps of selecting, determining one or more values, and determining which, if any, names in a plurality of sets of names until the entire input string has been selected.

14. (Original) The method of claim 13, wherein portions selected have a predetermined size, and wherein the method further comprises the step of selecting a number of predetermined sizes and performing the steps of selecting, determining one or more values, and determining which, if any, names in a plurality of sets of names for each of the predetermined sizes.

20 25 15. (Original) The method of claim 14, wherein the step of using changes further comprises the step of determining permutation patterns corresponding to counts greater than or equal to a predetermined count.

16. (Original) The method of claim 15, further comprising the step of determining maximal permutation patterns from the determined permutation patterns.

30 17. (Original) The method of claim 16, wherein the step of determining

which, if any, names in a plurality of sets of names further comprises the step of determining location lists for each of the names corresponding to permutation patterns, and wherein the step of determining maximal permutation patterns further comprises the steps of comparing location lists for permutation patterns and eliminating duplicate permutation patterns by using the
5 location lists.

18. (Original) The method of claim 1, wherein the at least one character is a single character and wherein the step of selecting further comprising selecting a portion of the input string that differs from the previously selected portion of the input string by moving a
10 window one character, from the previously selected portion, along the input string, the window selecting the new portion of the input string.

19 (Original) The method of claim 1, wherein the sets of names are stored in
a balanced search tree
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20. (Currently Amended) An apparatus for discovering permutation patterns from an input string having a plurality of characters, each character being from an alphabet, for utilization in an application that processes co-located elements discovered in said input string and that processes a relationship between groups of said characters identified by said
20 permutation patterns, the apparatus comprising:

a memory;

at least one processor coupled to the memory, the at least one processor configured:

25 to select a new portion of the input string, the new portion differing from a previously selected portion of the input string by at least one new character of the input string;

to determine one or more values for how many of the at least one new characters are in the portion of the input string;

30 to determine which, if any, names in a plurality of sets of names have changed by selection of the new portion, the plurality of sets comprising a first set and a plurality of additional sets, wherein the first set corresponds to all of the characters in the alphabet and to

values of how many of the characters of the alphabet are in the previously selected portion, wherein the values are names for the first set, and wherein each additional set comprises names corresponding to selected pairs of names from a single other set;

to use changes in the names to determine the permutation patterns; and

5 to provide said permutation patterns for utilization in said application that processes co-located elements discovered in said input string and that processes a relationship between said groups of said characters identified by said permutation patterns.

10 21. (Original) The apparatus of claim 20, wherein the at least one processor is further configured, in order to determine the plurality of levels:

to determine the first set by determining values of how many of each of the characters of the alphabet are in the previously selected portion; and

15 to determine the additional sets by assigning names for a given additional set to selected pairs of names from another of the sets, wherein each assigned name is unique to the names for a selected pair

20 22. (Original) The apparatus of claim 20, wherein the at least one processor is further configured, when determining which, if any, names in a plurality of sets of names have changed determines that a name has changed to determine that a new name is needed for the changed name.

25 23. (Original) The apparatus of claim 20, wherein the at least one processor is further configured to determine, for a name that has changed in the sets of names, a location in the input string that corresponds to the changed name

24. (Original) The apparatus of claim 20, wherein each of the names in the sets of names corresponds to a pattern, and wherein the at least one processor is further configured, when using changes in the names, to select permutation patterns from the patterns

30 25. (Original) The apparatus of claim 20, wherein the additional sets have

names corresponding to only a single pair of names from another set

26. (Original) The apparatus of claim 20, wherein the at least one processor is further configured, when using changes in the names to determine permutation patterns, to
5 correlate the changed names with permutation patterns.

27. (Original) The apparatus of claim 20, wherein the at least one character is a single character and wherein the at least one processor is further configured, when selecting a new portion of the input string, to select a portion of the input string that differs from the
10 previously selected portion of the input string by moving a window one character, from the previously selected portion, along the input string, the window selecting the new portion of the input string.

28. (Original) The apparatus of claim 20, wherein the sets of names are stored
15 in a balanced search tree.

29. (Currently Amended) An article of manufacture for discovering permutation patterns from an input string having a plurality of characters, each character being from an alphabet, for utilization in an application that processes co-located elements discovered
20 in said input string and that processes a relationship between groups of said characters identified by said permutation patterns, the article of manufacture comprising:

a computer readable medium containing one or more programs which when executed implement the steps of:

selecting a new portion of the input string, the new portion differing from a
25 previously selected portion of the input string by at least one new character of the input string;

determining one or more values for how many of the at least one new characters are in the portion of the input string;

determining which, if any, names in a plurality of sets of names have changed by selection of the new portion, the plurality of sets comprising a first set and a plurality of
30 additional sets, wherein the first set corresponds to all of the characters in the alphabet and to

values of how many of the characters of the alphabet are in the previously selected portion, wherein the values are names for the first set, and wherein each additional set comprises names corresponding to selected pairs of names from a single other set;

using changes in the names to determine the permutation patterns; and

5 providing said permutation patterns for utilization in said application that processes co-located elements discovered in said input string and that processes a relationship between said groups of said characters identified by said permutation patterns

10 30. (Previously Presented) The method of claim 1, wherein said relationship is structural.

15 31. (Previously Presented) The method of claim 1, wherein said relationship is functional.

32 (Previously Presented) The apparatus of claim 20, wherein said relationship is structural.

20 33 (Previously Presented) The apparatus of claim 20, wherein said relationship is functional.

34. (Previously Presented) The article of manufacture of claim 29, wherein said relationship is structural

25 35 (Previously Presented) The article of manufacture of claim 29, wherein said relationship is functional.